

Microwave Digestion Standard Laboratory Module™ (SLM™)

General Overview of the Microwave Digestion SLM

The Microwave Digestion SLM automates the microwave-assisted acid digestion of soil and biological samples. Using sealed pressure vessels, it speeds the digestion process by allowing significantly elevated processing temperatures as compared to open-vessel digestion.

Environmental Protection Agency (EPA) Method

This SLM is normally used to implement USEPA Method 3051 for the digestion of soil and biological samples.

Standard Analysis Model (SAM)

This SLM will normally be employed in a SAM used for metals analysis.

Advantages

This SLM offers the advantage of automated operation thus reducing labor requirements and possible human exposure to acidic liquids and fumes. It complies with Contaminant Analysis Automation (CAA) Program protocols.

General Description of the Microwave Digestion SLM

This SLM receives pressure vessels that have been previously loaded with a soil sample and appropriate concentrated acid. The vessels are loaded into the SLM with a robotic manipulator or manually. The SLM will open an access door on command and position a vessel turntable to a selected location. After receiving up to six vessels, the SLM is commanded to close the door and commence microwave irradiation of the sample vessels at a programmable power level and duration. The turntable is constantly rotated during the process to assure uniform heating. Typically heating times are on the order of 10 minutes. At the end of the programmed heating cycle the



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Figure 1. The Microwave Digestion SLM.

SLM notifies the host controller and is ready to open the access door and present the sample vessels to the robotic or human operator.

This SLM was derived from a manually operated CEM Corporation MDS 2100 microwave digestion oven. A controller and software were developed to configure the oven as a CAA-compliant device, and the manually operated access door was replaced with an automatic unit. The turntable drive was modified to allow accurate rotary positioning of vessels for reliable access by the robot.

Industrial Partner

SciBus Analytical, Inc.

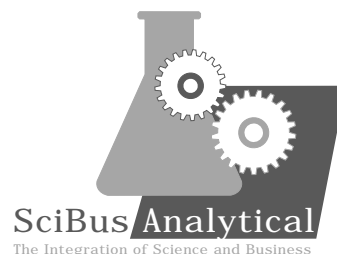
Developers

The Microwave Digestion SLM was developed at Oak Ridge National Laboratory in the Robotics and Process Systems Division.

Status

This SLM is in the proof-of-principle stage of development. It has not yet been validated.

Standard Laboratory Module and SLM are registered trademarks of SciBus Analytical, Inc.



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